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## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : UNI CHARM CORP

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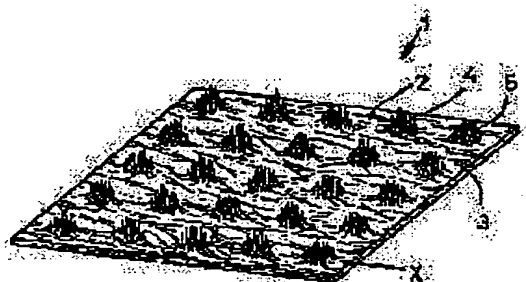
(72)Inventor : KOBAYASHI TOSHIO

## (54) NONWOVEN FABRIC AND ITS PRODUCTION

## (57)Abstract:

PURPOSE: To provide the surface of flexible nonwoven fabric with projected parts and to improve wiping performance.

CONSTITUTION: A fiber web comprising  $\approx$  20wt.% fibers having  $\approx$  1 denier fineness and 3-20 mm fiber length is treated with a high-pressure jetting water flow on a porous supporting member having 0.2-1mm pore diameter and 2.5-30% rate of hole area, the fibers 2 are interlaced and rearranged to give nonwoven fabric 1 having napped projected parts 4 on one side. The nonwoven fabric is flexible and the projected parts can scratch off dirt. In the projected parts 4, the fibers 2 are lined in the direction of thickness of the nonwoven fabric 1 and capillarity works between the fibers 2 to supply water to a face to be wiped or to draw up water.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] A fiber web which contains fiber with a fineness [ of 1 denier or less ] and a fiber length of 3-20mm 20% of the weight or more in dryness is made into 100 - 500% of the weight of water content. By fiber down stream processing to which a bore of 0.2-1mm of apertures leads on a perforated support surface which exists in the range of 2.5 - 30% of hole density, makes a water jet style act on this web after an appropriate time, and performs a confounding and a rearrangement of fiber While an end of fiber flows into a base material contact surface side of said web at said bore, it is made to arrange by said web thickness direction and a letter height of piloerection is formed A manufacture method of a nonwoven fabric characterized by being made to arrange in parallel with the real up aforementioned support surface, and forming a smooth side while fiber carries out a confounding between bores.

[Claim 2] A manufacture method including a production process on which said fiber down stream processing makes a water jet style of 20 - 40 ml/sec-cm act crosswise [ of said web ] on a nonporous base material of 50 degrees of hardness or more following said perforated base material according to claim 1.

[Claim 3] A manufacture method of a nonwoven fabric including a production process which said fiber down stream processing makes a water jet style act on said web on a mesh screen following said perforated base material, and forms puncturing in a part corresponding to a knuckle of said screen according to claim 1. 4. Fiber with a Fineness [ of 1 Denier or Less ] and a Fiber Length of 3-20Mm is Included 20% of the Weight or More in Dryness. While fiber is the nonwoven fabric which comes to carry out a confounding and an one side side of this nonwoven fabric is dotted with a letter height of piloerection which an end of said fiber arranges and forms in the nonwoven fabric thickness direction by predetermined pattern Said nonwoven fabric characterized by for said fiber which carried out the confounding arranging in real Kamitaira side, and forming a smooth side between these projections.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the flexible nonwoven fabric excellent in wiping engine performance, such as waterdrop.

[0002]

[Description of the Prior Art] The nonwoven fabric is used as a kind of the textile for wiping a windowpane, a table, etc. conventionally. It is common knowledge that a nonwoven fabric can change the engine performance broadly by proper selection of raw material fiber or a process. For example, since what carried out heat embossing processing of the nonwoven fabric which used the thermoplastic synthetic fiber, and prepared much irregularity in the surface acts so that the projection may wipe off and the dirt of a field may be scratched, it is convenient for dirt dropping. Moreover, the nonwoven fabric to which the confounding of the fiber with small fineness was carried out in the operation of hydrostatic pressure, such as a water jet style, is flexible compared with the nonwoven fabric which carried out the fiber confounding by the binder or heat welding, and suitable for wiping the surface of a delicate thing. For example, a U.S. Pat. No. 3,616,175 official report carries out the confounding of the rayon fiber 1 denier or less by the high-pressure water jet style on the base material which consists of a plate or a mesh screen, and gives the example which uses an open example and a rayon fiber with a length of about 40mm for the nonwoven fabric manufacturing technology of the appearance similar to chamois leather with the sufficient wiping engine performance.

[0003]

[Problem(s) to be Solved by the Invention] When carrying out heat embossing of the nonwoven fabric, it is difficult to be able to remove dirt effectively, but on the other hand to adjust concavo-convex height according to embossing conditions, for fiber to fuse in the case of embossing, to be easy to become a lump, and to obtain the flexible touch. on the other hand, by the manufacturing technology of said U.S. Pat. No. 3,616,175 official report, it is comparatively long and fiber with small fineness arranges superficially — the surface — it does not have the smooth ease of dropping of dirt although it is flexible and the good nonwoven fabric of the touch can be obtained, in case the surface is irregularity for this nonwoven fabric.

[0004] Then, this invention has small fineness and makes it the technical problem to obtain a nonwoven fabric with the sufficient wiping engine performance which has an effect in dirt dropping by making a water jet style act on the web of the moisture state which consists of comparatively short fiber on a perforated base material, performing the rearrangement and confounding of fiber, and building much letter projections of piloerection to an one side side.

[0005]

[Means for Solving the Problem] The place made into a summary in order that this invention may solve said technical problem is as follows.

[0006] If it is in a manufacture method of a nonwoven fabric concerning this invention A fiber web which contains fiber with a fineness [ of 1 denier or less ] and a fiber length of 3-20mm 20% of the weight or more in dryness is made into 100 - 500% of the weight of water content. This fiber web is drawn on a perforated support surface in which a bore of 0.2-1mm of apertures

exists in the range of 2.5 – 30% of hole density, and fiber down stream processing which a water jet style is made to act on this web after an appropriate time, and performs a confounding and a rearrangement of fiber is used. What it is made to arrange in parallel with a parenchyma top support surface, and a smooth side is formed for by this down stream processing while a fiber end flows into a base material contact surface side of a web at a bore of a base material, being made to arrange by the thickness direction of a web, forming a letter height of piloerection and fiber's carrying out a confounding between bores on the other hand is that feature.

[0007] In one of the embodiments of this manufacture method, water jet style processing on a nonporous base material which follows a perforated base material at said down stream processing is included. Moreover, in other one of the embodiments, water jet style processing on a mesh screen following a perforated base material is included.

[0008] A nonwoven fabric concerning this invention is the thing of a kind manufactured by said manufacture method, and what fiber with a fineness [ of 1 denier or less ] and a fiber length of 3–20mm is included 20% of the weight or more in dryness, and it has for a letter height of piloerection which fiber is the nonwoven fabric which comes to carry out a confounding, and has been arranged to a predetermined pattern at an one side side is that feature.

[0009]

[Function] If it is in the manufacture method of the nonwoven fabric concerning this invention, fineness is comparatively small, without fiber dispersing, if conditions are stable and a high-pressure water jet style is made to act on this web since water is beforehand included in the web which consists of fiber with short fiber length, a rearrangement is carried out and a confounding is carried out efficiently. It is easy to flow into the bore of a base material, the fiber end which flowed arranges in the web thickness direction, and forms the height of the letter of piloerection in the base material contact surface of a web, and it is arranged in parallel with a base material plane, and forms a smooth side while fiber, on the other hand, carries out the confounding of the fiber short in the case of a rearrangement mutually between bores.

[0010] Its fineness is small, and since fiber is carrying out the confounding mutually only with the stream, without using a binder and thermofusion and it moreover has many heights of the letter of piloerection on one side, it is flexible, and the nonwoven fabric concerning this invention has the good touch, and when wiping the field which became dirty with this nonwoven fabric, it can scratch dirt by the height. In a height, moisture can be promptly sucked up from the wiping side which has got wet, for example by the capillary action produced between the fiber arranged in the thickness direction.

[0011]

[Example] It is as follows when it explains based on drawing of attachment of the details of this invention.

[0012] Drawing 1 is the perspective diagram of the nonwoven fabric 1 concerning this invention. Fiber 2 carries out the confounding of the surface side of a nonwoven fabric 1 mutually, and it consists of a smooth side 3 over which it is distributed superficially, and a height 4 which the end 5 of fiber 2 starts and forms in the thickness direction of a nonwoven fabric 1 from the smooth side 3, and the rear-face side is smooth in general.

[0013] Drawing 2 </A> shows X-X-ray cross section in drawing 1 . Between the table and rear face of a nonwoven fabric 1, the fiber 2 which carries out a confounding mutually is distributed in the thickness direction in the shape of a layer. A height 4 presents the appearance of the letter of piloerection by the end 5 of a large number arranged in the thickness direction, and when the distribution density of this height 4 is high, the whole nonwoven fabric presents the letter appearance of piloerection.

[0014] It is made of polyester fiber with a fineness [ of 0.7 deniers ], and a fiber length of 10mm, the pulse duty factor [ as opposed to / height / 4 / height / from the base / 0.2–1mm and nonwoven fabric surface area in the path of 0.05–1mm and a base ] is made 2.5 – 30%, and a nonwoven fabric 1 can be used as a proper array pattern, and can give a surface pattern to a nonwoven fabric 1.

[0015] Drawing 3 shows typical process drawing for manufacturing a nonwoven fabric 1. It has wrap dehydration and dryer 105 grade for some 3 endless belts 103. the [ the roller 104 with

which this manufacturing process intervenes between the 1st, 2 and the 3 endless belt 101,102,103 which progress to a left hand from the right hand of drawing, the 2nd, and the 3 endless belt 102,103, and ] — The 5th nozzle 115 is constructed over the 2nd, 3, and 4 nozzle 112,113,114 and the roller 104 upper part crosswise [ of a belt ] in the 2 endless belt 102 upper part. the — the 1 endless belt 101 upper part — the [ the 1st nozzle 111 and ] — The amount of water from a nozzle is almost uniform in the cross direction. In the 1st nozzle 111, it waters with the low voltage of 3–10kg/cm<sup>2</sup>, and injection of 30–130kg/cm<sup>2</sup> high-pressure water is enabled with the 2nd, 3, and 4 nozzle 112,113,114 and the 5th nozzle 115.

[0016] drawing 4 — the — it is the part plan of the 2 endless belt 102. The bore 121 of 0.2–1mm of apertures arranged to the predetermined pattern is formed in this belt 102 by 2.5 – 30% of hole density, and the water injected on the belt 102 in drawing 3 can be drained to the catchment pan 116. in addition, this wastewater — being related — the — what the 1 endless belt 101 lessens amount of water of the 1st nozzle 111 comparatively, and is operated — it is — the — the bore like the 2 endless belt 102 is not necessarily required. Moreover, in a roller 104, along a roller side, water jet flows promptly and falls. Incidentally, making water jet discharge promptly from base materials, such as a belt, is known as common use technology to which the confounding of the fiber is efficiently carried out with water jet.

[0017] the — as the web 152 of the damp or wet condition which has put the random web 151 which consists of polyester fiber 2 of the fineness of 0.7 deniers, the fiber length of 10mm, and basis-weight 70 g/m<sup>2</sup> on the 1 endless belt 101, and contains 100 – 500% of the weight of water by the water spray from the 1st nozzle 111 — the — it transports to the 2 endless belt 102. A web 152 is processed with the high-pressure water jet from the 2nd, 3, and 4 nozzle 112,113,114 which set up water pressure highly one by one, and is taken as the web 153 which fiber 2 carries out a confounding mutually, and is in a new array condition. this web 153 — fiber 2 — the — the direction to which the 2 endless belt 102 goes, and the orientation arranged in parallel are shown, and the smooth side which imitates the surface of a belt 102 in the contact surface with this belt 102 is formed. In a bore 121 and its periphery, fiber 2 flowed into the bore 121 with wastewater, the bore 121 went caudad and the end has arranged. To a web 153, 70–130kg/cm<sup>2</sup> high-pressure water is further injected on a roller 104, the confounding density of fiber 2 is raised, and it considers as a web 154. a web 154 — the — the volume after transporting to the 3 endless belt 103 and dehydrating and drying with a dryer 105 — \*\*\*\* — it considers as the nonwoven fabric 155 which is a finished product. the thing as drawing 1 and the nonwoven fabric 1 of the illustration to 2 with this same nonwoven fabric 155 — it is — the — the contact surface with the 2 endless belt 102 is the surface of a nonwoven fabric 1, and the part where fiber 2 flowed into the bore 121 is the height 4 of the letter of piloerection, and it is the smooth side 3 between heights 4. In a nonwoven fabric 155, the field which counters each nozzles 111–115 is a rear face of a nonwoven fabric 1.

[0018] The fiber web which replaces with polyester fiber and contains proper fiber with a fineness [ of 1 denier or less ] and a fiber length of 3–20mm 20% of the weight or more in dryness can be used for the web 151 of this example. If fineness is larger than 1 denier, since the flexibility of a nonwoven fabric is spoiled, it is not desirable. If fiber length is shorter than 3mm, since the amount of fiber of the fiber 2 which stops being able to carry out easily for a confounding mutually, and is spilt out with wastewater from a bore 121 increases, it is not desirable. On the other hand, if fiber length is longer than 20mm, since it will become, or the fiber number per fixed basis weight will decrease that fiber cannot flow easily toward a bore 121 and the number of fiber ends will decrease in connection with it, formation of a height 4 becomes difficult. Similarly, the amount of the necessary fiber used will be difficult for formation of a height 4 at less than 20%, and, moreover, a nonwoven fabric 1 will lack flexibility.

[0019] In a manufacturing process, in using a roll 104 and the 5th nozzle 115, the degree of hardness of a roll is made into 50 degrees or more, and it enables it to be equal to use of high-pressure water jet. The amount of water jet can raise fiber confounding density by considering as 20 – 40 ml/sec-cm in the cross direction of a web 101, eliminating water jet efficiently along with the 104th page of a roll. the [ in addition, ] — the nozzle number and water pressure on the 2 endless belt 102 are set up suitably, and when confounding density high enough is obtained on

this belt 102, a roll 104 and the 5th nozzle 115 can be excluded. Moreover, if it replaces with the combination of a roll 104 and the 5th nozzle 115 and a web 153 is suitably processed with a mesh screen belt using the nozzle of a number, puncturing which imitates a knuckle can be prepared in the part which contacted the knuckle of a mesh.

[0020] It is possible to make the thickness direction one direction arrange fiber 2 substantially in a height 4 in the nonwoven fabric 1 by such manufacture method. Consequently, if the nonwoven fabric 1 is wet with water, the water can be wiped off by the capillary action between fiber 2, a field can be supplied, and the field can be wet promptly. Moreover, reliance can suck up water for the nonwoven fabric 1 which was damp with water and which wiped off and got dry in the field promptly by ~~\*\*\*\*~~ and this capillary action.

[0021]

[Effect of the Invention] Since the nonwoven fabric concerning this invention has carried out the confounding of the fiber with small fineness according to the high-pressure stream, its touch is flexible. Since the height is prepared in the surface, it wipes off by this height and the dirt of a field can be scratched. Since fiber has arranged in the nonwoven fabric thickness direction in the height, it is easy for capillary action to work between fiber, and to wet a wiping side with water or to suck up water from a wiping side.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The perspective diagram of the nonwoven fabric concerning this invention.

[Drawing 2] X-X-ray cross section in drawing 1 .

[Drawing 3] Typical manufacturing process drawing of a nonwoven fabric.

[Drawing 4] the -- the part plan of 2 endless belt.

[Brief Description of Notations]

1 Nonwoven Fabric

2 Fiber

3 Smooth Side

4 Height

5 End

102 Perforated Base Material

104 Nonporous Base Material

121 Bore

151 Fiber Web

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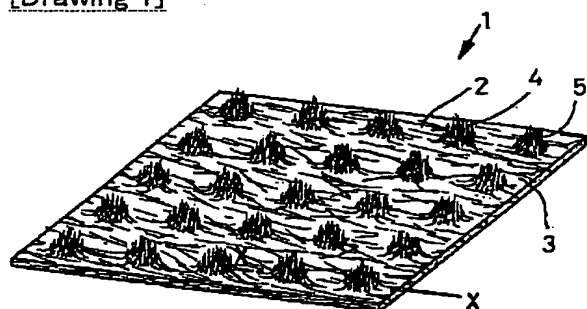
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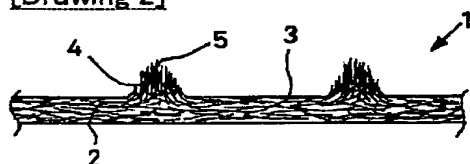
**DRAWINGS**

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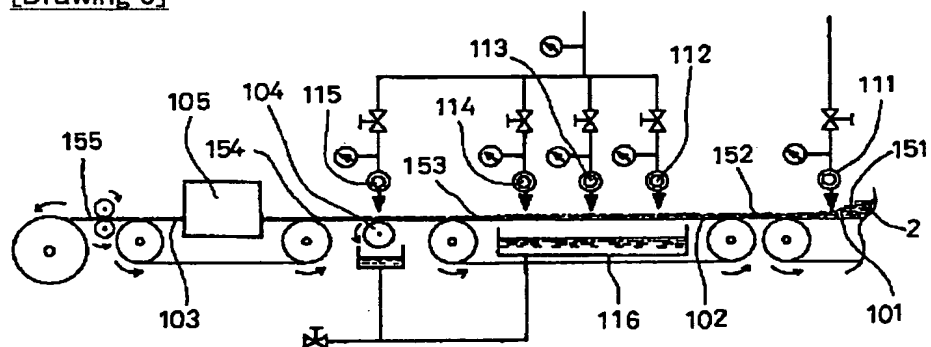
[Drawing 1]



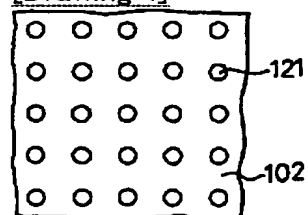
[Drawing 2]



[Drawing 3]



[Drawing 4]




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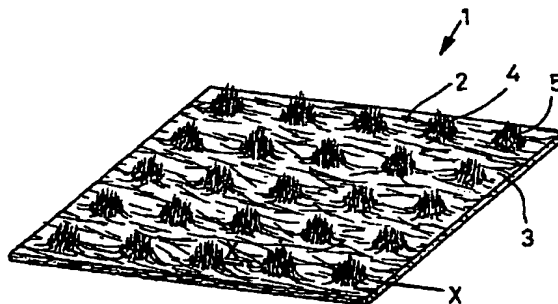
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(54)【発明の名称】 不織布、およびその製造方法

(57)【要約】

【目的】 柔軟な不織布の表面に突起部を設け、拭き取り性能を向上させる。

【構成】 繊度1デニール以下、繊維長3~20mmの繊維を20重量%以上含む繊維ウェブを孔径0.2~1mm、開孔率2.5~30%の有孔支持体上で高圧噴射水流により処理し、繊維2の交絡と再配列とを行い、片面に起毛状突起部4を有する不織布1を得る。不織布1は柔軟で、突起部4では汚れを掻き取ることができる。突起部4において繊維2が不織布1の厚み方向に配列し、繊維2間には拭き取り面に対し水を供給、または吸い上げることが可能な毛管作用が働く。



## 【特許請求の範囲】

【請求項1】 織度1デニール以下、繊維長3～20mmの繊維を乾燥状態において20重量%以上含む繊維ウェブを100～500重量%の含水率にし、孔径0.2～1mmの透孔が開孔率2.5～30%の範囲で存在する有孔支持体表面上に導き、しかる後該ウェブに噴射水流を作用させて繊維の交絡と再配列とを行う繊維処理工程により、前記ウェブの支持体接触面側において繊維の末端部が前記透孔に流入し前記ウェブ厚み方向に配列せしめられて起毛状突起部を形成する一方、透孔間において繊維が交絡するとともに実質上前記支持体表面と並行に配列せしめられて平滑面を形成することを特徴とする不織布の製造方法。

【請求項2】 前記繊維処理工程が、前記有孔支持体に続く硬度50度以上の無孔支持体上において前記ウェブの幅方向に20～40ml/sec・cmの噴射水流を作用させる工程を含む請求項1記載の製造方法。

【請求項3】 前記繊維処理工程が、前記有孔支持体に続くメッシュスクリーン上において前記ウェブに噴射水流を作用させ、前記スクリーンのナックルに対応する部位に開孔を形成する工程を含む請求項1記載の不織布の製造方法。4. 織度1デニール以下、繊維長3～20mmの繊維を乾燥状態において20重量%以上含む、繊維が互いに交絡してなる不織布であって、該不織布の片面側には前記繊維の末端部が不織布厚み方向に配列して形成する起毛状突起部が所定パターンで点在するとともに、該突起間においては前記交絡した繊維が実質上平面的に配列し平滑面が形成されていることを特徴とする前記不織布。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 この発明は、水滴等の拭き取り性能に優れた柔軟な不織布に関する。

## 【0002】

【従来の技術】 従来、窓ガラスやテーブルなどを拭くための布帛の一種として不織布が使用されている。不織布は、原料繊維や製法の適宜の選択によりその性能を幅広く変化させることができることは周知である。例えば、熱可塑性合成繊維を使用した不織布を熱エンボス処理して表面に凹凸を多数設けたものは、その突起が拭き取り面の汚れを掻き取るように作用するから汚れ落としに都合がよい。また、織度の小さい繊維を噴射水流等の流体圧の作用で交絡させた不織布は、バインダーや熱融着により繊維交絡させた不織布に比べ柔軟であり、繊細なものの表面を拭くのに適している。例えば、米国特許第3,616,175号公報は、1デニール以下のレイヨン繊維をプレートまたはメッシュスクリーンからなる支持体上で高圧噴射水流により交絡させ、拭き取り性能がよいセーム革に似た外観の不織布製造技術を開示し、長さ約40mmのレイヨン繊維を使用する実施例を挙げて

いる。

## 【0003】

【発明が解決しようとする課題】 不織布を熱エンボスする場合には、エンボス条件により凹凸の高さを加減し、効果的に汚れを落とすようにすることができるが、その反面エンボスの際に繊維が熔融して塊になり易く、柔軟な肌触りを得ることが難しい。一方、前記米国特許第3,616,175号公報の製造技術では、比較的長めで、織度の小さい繊維が平面的に配列することにより、表面平滑な柔軟で肌触りのよい不織布を得ることはできるが、この不織布は表面が凹凸であるときの汚れの落とし易さを具えてはいない。

【0004】そこで、この発明は織度が小さく、比較的短い繊維からなる含水状態のウェブに有孔支持体上で噴射水流を作用させて繊維の再配列と交絡とを行い、片面側に多数の起毛状突起をつくることにより、汚れ落としに効果のある拭き取り性能のよい不織布を得ることを課題にしている。

## 【0005】

【課題を解決するための手段】 この発明が前記課題を解決するために要旨とするところは、以下のとおりである。

【0006】この発明に係る不織布の製造方法にあっては、織度1デニール以下、繊維長3～20mmの繊維を乾燥状態において20重量%以上含む繊維ウェブを100～500重量%の含水率にし、かかる繊維ウェブを孔径0.2～1mmの透孔が開孔率2.5～30%の範囲で存在する有孔支持体表面上に導き、しかる後このウェブに噴射水流を作用させて繊維の交絡と再配列とを行う繊維処理工程を利用する。この処理工程により、ウェブの支持体接触面側において繊維末端部が支持体の透孔に流入し、ウェブの厚み方向に配列せしめられて起毛状突起部を形成し、一方透孔間において繊維が交絡するとともに実質上支持体表面と並行に配列せしめられて平滑面を形成する、ことがその特徴である。

【0007】かかる製造方法の実施態様の一つにおいては、前記処理工程に有孔支持体に続く無孔支持体上での噴射水流処理を含む。また、実施態様の他の一つにおいては、有孔支持体に続くメッシュスクリーン上での噴射水流処理を含む。

【0008】この発明に係る不織布は、前記製造方法によって製造される類のものであって、織度1デニール以下、繊維長3～20mmの繊維を乾燥状態において20重量%以上含む、繊維が互いに交絡してなる不織布であり、片面側に所定パターンに配置した起毛状突起部を有している、ことがその特徴である。

## 【0009】

【作用】 この発明に係る不織布の製造方法にあっては、比較的織度が小さく、繊維長の短い繊維からなるウェブに予め水を含ませてあるから地合いが安定しており、こ

のウェブに高圧の噴射水流を作用させると繊維が飛散することなく再配列し、かつ、効率よく交絡する。再配列の際に短い繊維は支持体の透孔に流入し易く、流入した繊維末端部がウェブ厚み方向に配列してウェブの支持体接触面に起毛状の突起部を形成し、一方透孔間においては、繊維が互いに交絡するとともに支持体平面と並行に配列して平滑面を形成する。

【0010】この発明に係る不織布は、繊維が小さく、バインダーや熱溶解を利用することなく水流のみで繊維が互いに交絡しており、しかも片面には起毛状の突起部を多数有するから柔軟で肌触りがよく、この不織布で汚れた面を拭くときには、突起部で汚れを掻き取ることができる。突起部では厚み方向に配列した繊維の間に生じる毛管作用により、例えば濡れている拭き取り面から速やかに水分を吸い上げることができる。

【0011】

【実施例】この発明の詳細を添付の図に基づいて説明すると、以下のとおりである。

【0012】図1は、この発明に係る不織布1の斜視図である。不織布1の表面側は、繊維2が互いに交絡し、かつ、平面的に分布する平滑面3と、繊維2の末端部5が平滑面3から不織布1の厚み方向に立ち上がって形成する突起部4とからなり、裏面側は概ね平滑である。

【0013】図2は、図1におけるX-X線断面を示す。不織布1の表・裏面間では、互いに交絡する繊維2が厚み方向に層状に分布している。突起部4は、厚み方向に配列した多数の末端部5により起毛状の外観を呈し、この突起部4の分布密度が高いときには不織布全体が起毛状外観を呈する。

【0014】不織布1は、繊維0.7デニール、繊維長10mmのポリエステル繊維でできており、突起部4は、その基部からの高さが0.05~1mm、基部の径が0.2~1mm、不織布表面積に対する占有率が2.5~30%にしてあり、適宜の配列パターンにして不織布1に表面模様をつけることができる。

【0015】図3は、不織布1を製造するための模式的工程図を示す。この製造工程は、図の右手から左手へと進む第1、2、3無端ベルト101、102、103、第2、3無端ベルト102、103間に介在するローラー104、第3無端ベルト103の一部を覆う脱水・乾燥機105等を有し、第1無端ベルト101上方には第1ノズル111、第2無端ベルト102上方には第2、3、4ノズル112、113、114、およびローラー104上方には第5ノズル115がベルトの幅方向に架設してあり、ノズルからの水量はその幅方向においてほぼ一様である。第1ノズル111では3~10kg/cm<sup>2</sup>の低圧で散水し、第2、3、4ノズル112、113、114および第5ノズル115では30~130kg/cm<sup>2</sup>の高圧水を噴射可能にしてある。

【0016】図4は、第2無端ベルト102の部分平面

図である。このベルト102には所定パターンに配置した孔径0.2~1mmの透孔121が2.5~30%の開孔率で設けてあり、図3においてベルト102上に噴射された水を集水パン116へと排水することができる。なお、この排水に関し、第1無端ベルト101は、第1ノズル111の水量を比較的少なくして運転するもので、第2無端ベルト102のごとき透孔が必ずしも必要ではない。また、ローラー104においては、噴射水がローラー面に沿って速やかに流れ落ちる。因に、噴射水をベルト等の支持体上から速やかに排出させることは、噴射水により効率よく繊維を交絡させる慣用技術として知られている。

【0017】第1無端ベルト101には、繊維0.7デニール、繊維長10mm、坪量70g/m<sup>2</sup>のポリエステル繊維2からなるランダムウェブ151が載せてあり、第1ノズル111からの散水で100~500重量%の水を含む湿潤状態のウェブ152として第2無端ベルト102へ移送する。ウェブ152は水圧を順次高く設定した第2、3、4ノズル112、113、114からの高圧噴射水で処理して、繊維2が互いに交絡し、かつ、新たな配列状態にあるウェブ153とする。このウェブ153では、繊維2が第2無端ベルト102の進む方向と並行に配列する傾向を示し、このベルト102との接触面においてはベルト102の表面に倣う平滑面を形成している。透孔121およびその周縁においては繊維2が排水とともに透孔121へ流入し、その末端部が透孔121の下方向に向かって配列している。ウェブ153にはローラー104上で70~130kg/cm<sup>2</sup>の高圧水をさらに噴射し、繊維2の交絡密度を上げてウェブ154とする。ウェブ154は、第3無端ベルト103に移送し乾燥機105で脱水・乾燥した後、巻きとって完成品である不織布155とする。この不織布155は、図1、2に図示の不織布1と同じもので、第2無端ベルト102との接触面が不織布1の表面であり、繊維2が透孔121に流入した部位は起毛状の突起部4であり、突起部4間は平滑面3である。不織布155において、各ノズル111~115に対向する面は不織布1の裏面である。

【0018】この実施例のウェブ151には、ポリエステル繊維に代え繊維1デニール以下、繊維長3~20mmの適宜の繊維を乾燥状態において20重量%以上含む繊維ウェブを使用することができる。繊維が1デニールより大きいと、不織布の柔軟性が損なわれるから好ましくない。繊維長が3mmより短い繊維は互いに交絡し難くなり、また透孔121から排水とともに流失する繊維2の量が多くなるので好ましくない。一方、繊維長が20mmより長い繊維が透孔121に向かって流れ難くなったり、一定坪量当りの繊維本数が少なくなり、それに伴い繊維末端部の数が少なくなるから突起部4の形成が難しくなる。同様に、所要繊維の使用量が20%未

滴では突起部4の形成が難しく、しかも不織布1が柔軟性を欠くことになる。

【0019】製造工程において、ロール104と第5ノズル115とを使用するに当ってはロールの硬度を50度以上にし、高圧噴射水の使用に耐え得るようにしておく。噴射水量は、ウェブ101の幅方向において20～40ml/sec・cmとすることによって、ロール104面に沿い噴射水を効率よく排除しながら繊維交絡密度を上げることができる。なお、第2無端ベルト102上のノズル本数と水圧とを適宜に設定し、このベルト102上で十分に高い交絡密度を得た場合にはロール104と第5ノズル115とを省くことができる。また、ロール104と第5ノズル115との組み合わせに代え、メッシュスクリーンベルトと適宜本数のノズルとを使用してウェブ153を処理すると、メッシュのナックルに当接した部位にナックルに倣う開孔を設けることができる。

【0020】このような製造方法による不織布1では、突起部4において繊維2を実質的に厚み方向一方向に配列させることが可能である。その結果、不織布1が水で濡らしてあれば、繊維2間の毛管作用によりその水を拭き取り面へと供給し、その面を速やかに濡らすことができる。また、水で濡れた拭き取り面に乾いた不織布1を当てがえば、この毛管作用により水を速やかに吸い上げることができる。

\*

# \*【0021】

【発明の効果】この発明に係る不織布は、織度の小さい繊維を高圧水流により交絡させてあるから、肌触りが柔軟である。表面には突起部が設けてあるから、この突起部により拭き取り面の汚れを掻き取ることができる。突起部では、繊維が不織布厚み方向に配列しているから、繊維間には毛管作用が働いて、拭き取り面を水で濡らしたり、拭き取り面から水を吸い上げたりすることが容易である。

## 10 【図面の簡単な説明】

【図1】この発明に係る不織布の斜視図。

【図2】図1におけるX-X線断面図。

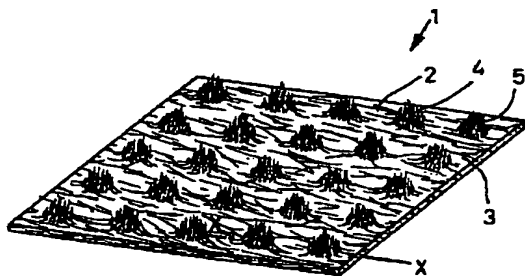
【図3】不織布の模式的製造工程図。

【図4】第2無端ベルトの部分平面図。

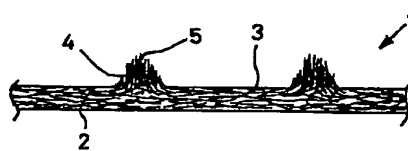
## 【符号の簡単な説明】

- 1 不織布
- 2 繊維
- 3 平滑面
- 4 突起部
- 5 末端部
- 102 有孔支持体
- 104 無孔支持体
- 121 透孔
- 151 繊維ウェブ

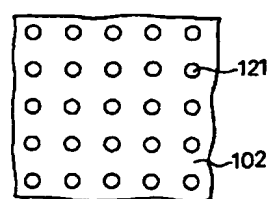
【図1】



【図2】



【図4】



【図3】

